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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/942,200	08/29/2001	Eugene P. Marsh	150.0064 0102	8194

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EXAMINER

NGUYEN, JOSEPH H

ART UNIT PAPER NUMBER

2815

DATE MAILED: 12/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/942,200

Applicant(s)

MARSH, EUGENE P.

Examiner

Joseph Nguyen

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE \_\_\_\_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 26 October 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 23, 25-27, 30-34, 37 and 41-51 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 23, 25-27, 30-34, 37 and 41-51 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 August 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____                                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____   | 6) <input type="checkbox"/> Other: ____                           |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 23, 25-27, 32-33, 37, 42-45 and 47-49 are rejected under 35 U.S.C. 102(b) as being anticipated by Horikawa et al. (US 6,049,103).

Regarding claims 23, 25 and 44, Horikawa et al. discloses in figure 5 a semiconductor device structure comprising a substrate 101 (column 7, line 22) including a surface and at least one active device 104b; and a conformal barrier layer 614 over at least a portion of the surface, wherein the barrier layer 614 is formed of platinum (x): ruthenium alloy where x is in the range of about 0.95 to about 0.995 (column 9, lines 3-10).

It is noted that the terms “chemical vapor deposited” and “simultaneously co-deposited” are merely the process limitation and therefore do not structurally distinguish from Horikawa et al. Also, layer 614 has uniform thickness (column 9, lines 6-8); as such it is conformal layer. Further, layer 614 is made of a platinum alloy including 0.5-5 at % (0.005-0.05) of ruthenium (column 9, lines 3-10), which means atomic percent of platinum is 95-99.5 at% or x is in the range of 0.95- 0.995.

Regarding claim 26, Horikawa et al. discloses the portion of the surface of the substrate 101 is a silicon-containing surface (column 7, lines 20-22).

Regarding claim 27, similar to claims 23 and 25 above, Horikawa et al. discloses in figure 5 a capacitor structure comprising a first electrode 614; a dielectric material 115 (column 9, line 9) on at least a portion of the first electrode; and a second electrode 616 on the dielectric material wherein at least the first electrode comprises a barrier layer formed of platinum (x): ruthenium wherein x is in the range of about 0.95 to about 0.995.

Regarding claim 32, Horikawa et al. discloses in figure 5 a memory cell structure comprising a substrate assembly 101 including at least one active device 104b; and a capacitor formed relative to the at least one active device, the capacitor comprising at least one electrode 614 including a barrier layer formed of platinum (x): ruthenium wherein x is in the range of about 0.95 to about 0.995.

Regarding claim 33, Horikawa et al. discloses in figure 5 the capacitor includes a first electrode 614 formed relative to a silicon containing region 101 of the at least one active device 104b; a dielectric material 115 on at least a portion of the first electrode; and a second electrode 616 on the dielectric material, wherein the first electrode comprises the barrier layer formed of platinum (x): ruthenium alloy (column 9, lines 3-8).

Regarding claims 37, 45 and 49, Horikawa et al. discloses in figure 5 an integrated circuit structure comprising a substrate assembly 101 including at least one active device 104b; and an interconnect formed relative to the at least one active

device, the interconnect comprising at least a barrier layer 614 formed of platinum (x): ruthenium wherein x is in the range of about 0.95 to about 0.995.

Regarding claims 42, 43, 47 and 48, Horikawa et al. discloses the thickness of the barrier layer 614 is 30-200 nm (column 9, lines 6-8) or 300-2000A, which falls in the claimed range of 10-10,000A or 100-500A.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 30, 31 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horikawa et al. in view of Wolters et al. (US 5,744,832).

Regarding claims 30 and 34, Horikawa et al. discloses in figure 5 substantially all the structure set forth in the claimed invention except the first electrode comprising an additional conductive layer. However, Wolters et al. discloses in figure 6 the first electrode comprising an additional conductive layer 110 to block the oxygen diffusion (column 7, lines 11-17). In view of such teaching, it would have been obvious at the time of the present invention to modify Horikawa et al. by including the first electrode comprising an additional conductive layer to block the oxygen diffusion.

Regarding claim 31, Wolters et al. discloses the additional conductive layer 111 is metal alloy (column 7, lines 11-16).

Claims 41, 46, 50 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horikawa et al. in view of Shan et al. (US 6,140,228).

Regarding claims 41, 46 and 50, Horikawa et al. discloses in figure 5 substantially all the structure set forth in the claimed invention except a substrate assembly comprising a small high aspect ratio opening. Applicant teaches in page 14, lines 15-21 of the instant application a small high aspect ratio opening is the one in which the width is less than about 1 micron and the depth is larger than the width. Shan et al. teaches the opening formed in a substrate that has a width less 1 micron and the depth (height) greater than the width (column 3, lines 48-60). Therefore, Shan et al. teaches the substrate comprising a small high aspect ratio opening. In view of such teaching, it would have been obvious at the time of the present invention to modify Horikawa et al. by including a substrate assembly comprising a small high aspect ratio opening to reliably form a metallization layer having good conductivity (column 2, lines 33-35, Shan et al.).

Regarding claim 51, Shan et al. discloses the width is 0.6 micron (column 3, lines 55-60), not about 1 micron as claimed. However, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify Horikawa et al. and Shan et al. by including the width of about 1 micron, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

### ***Response to Arguments***

Applicant's arguments with respect to claims 23, 25-27, 30-34, 37 and 41-51 have been considered but are moot in view of the new ground(s) of rejection.

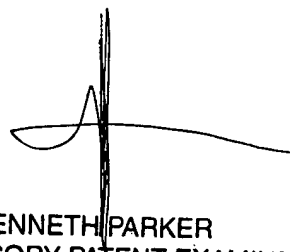
### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph Nguyen whose telephone number is (571) 272-1734. The examiner can normally be reached on Monday-Friday, 7:30 am- 4:30 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Parker can be reached on (571) 272-2298. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300 for regular communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Joseph Nguyen

November 5, 2006.



KENNETH PARKER  
SUPERVISORY PATENT EXAMINE